APPENDIX B

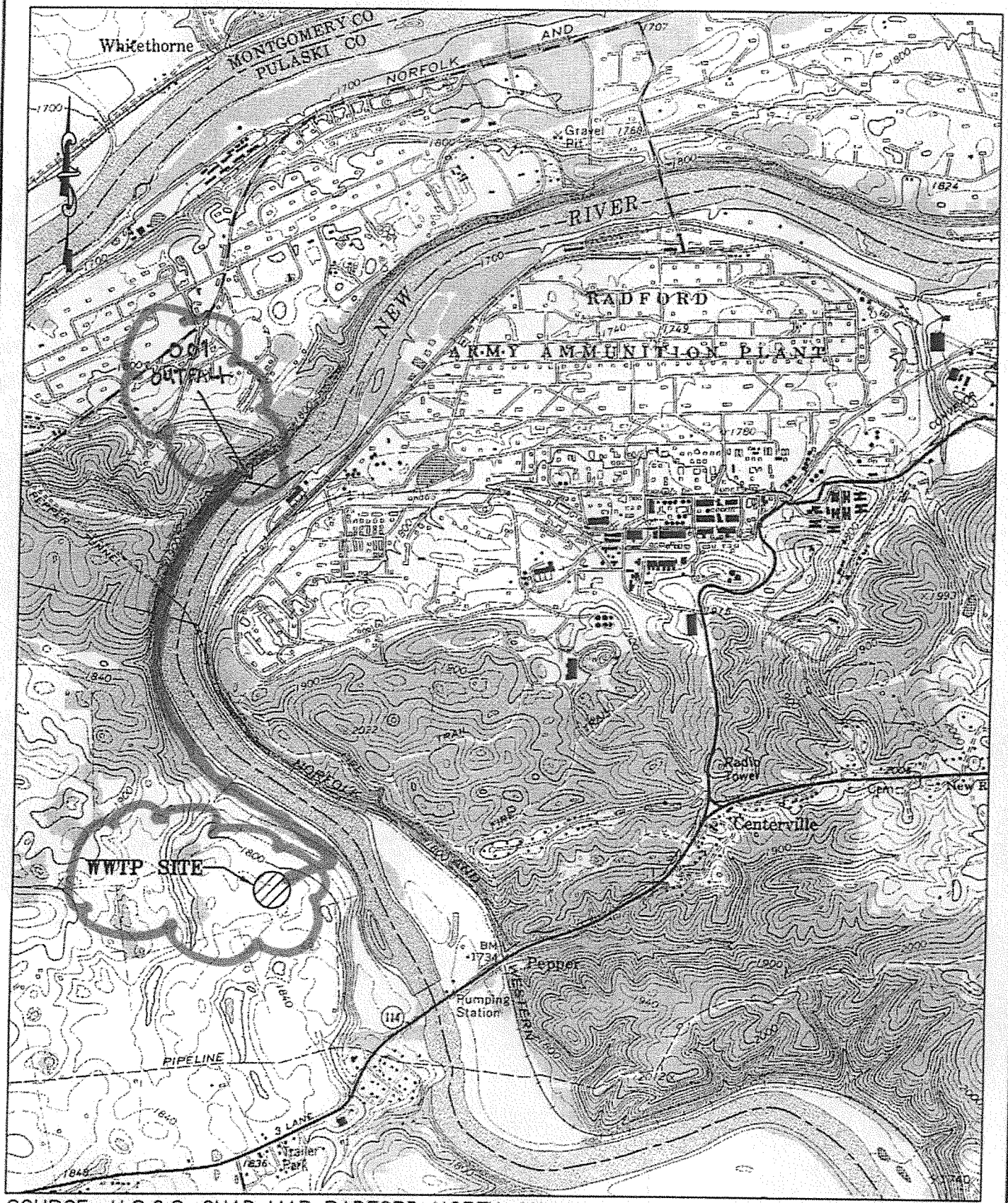
FACILITY INFORMATION

Location (Topographic) Map

Wastewater Treatment Process Schematic

Wastewater Treatment Process Narrative

Site Visit Report



SOURCE: U.S.G.S. QUAD MAP RADFORD NORTH, VA

PFRWTA
WWTP SITE LOCATION

Scale: 1"=2,000'

Figure 1-2

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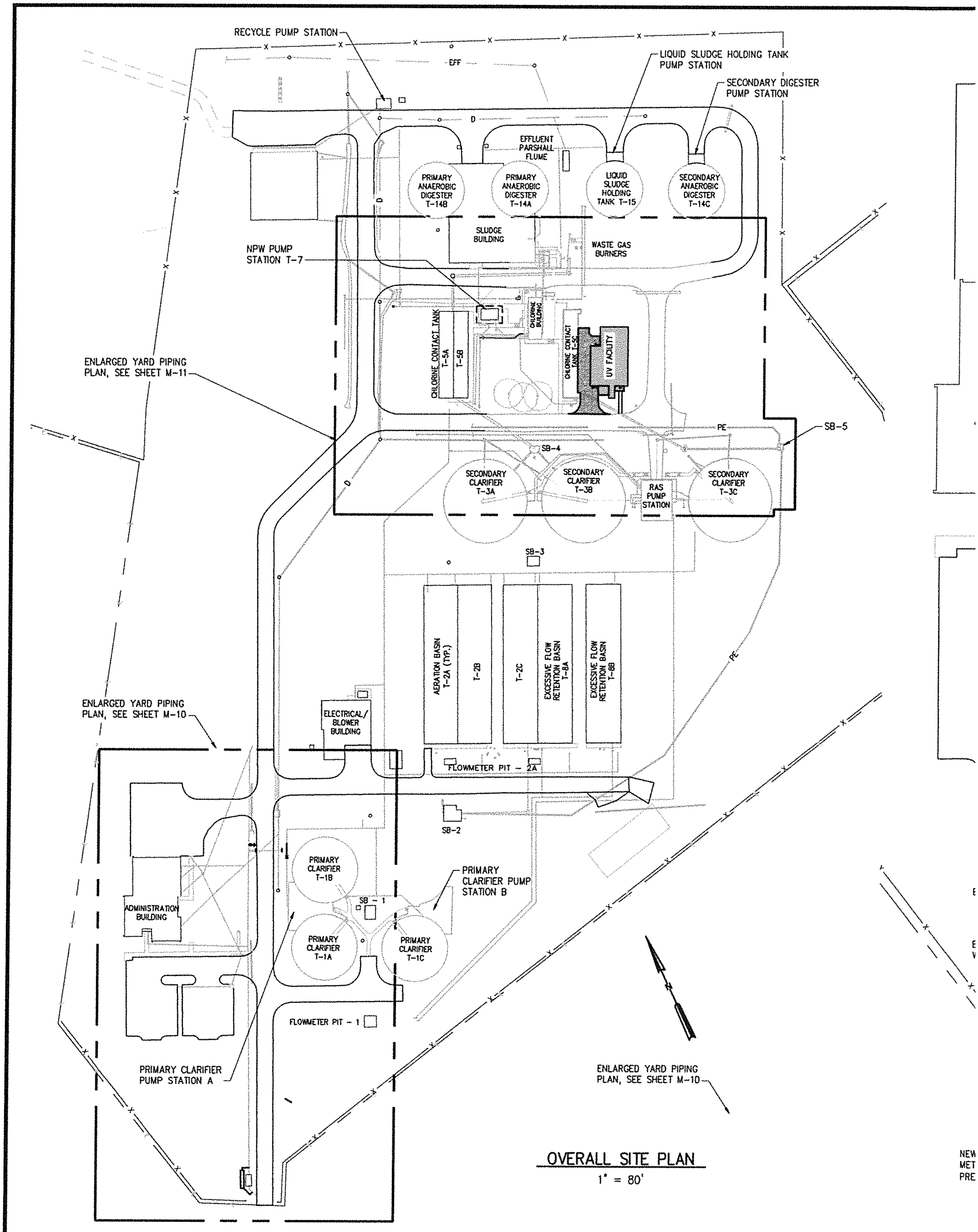
OLVER INCORPORATED



OVERALL SITE PLAN

1" = 80'

NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWING	11/9/2012	RLT
1	BID	2/11/2011	RLT
0	PERMIT APPROVAL	2/3/2011	RLT

DESIGNED MPV\PDS
DRAWN HRL
CHECKED
PROJ.ENGR. JRC
APPROVED

THIS DOCUMENT ORIGINALLY ISSUED FOR CONSTRUCTION AND SEALED BY RONALD L. TAYLOR, SEAL NUMBER 24649.

THIS DOCUMENT ORIGINALLY ISSUED FOR CONSTRUCTION AND SEALED BY JANICE R. CARROLL, SEAL NUMBER 34408.

RECORD DRAWING

THIS DRAWING HAS BEEN MODIFIED TO REFLECT FIELD CHANGES REPORTED BY THE CONTRACTOR OR ANOTHER PARTY, BUT NOT VERIFIED BY THE CERTIFYING ENGINEER

COMMONWEALTH OF VIRGINIA
RONALD L. TAYLOR
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PROFESSIONAL ENGINEER

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PEPPER'S FERRY REGIONAL WASTEWATER TREATMENT FACILITY PROCESS FLOW NARRATIVE

The drawing depicts the major facilities of the plant site. Pink coded units are influent structures (Flow meter Pit-1, and Splitter Box: SB-1) and primary treatment units (Primary Clarifiers T-1A, B, & C). Blue coding depicts the biological treatment (Aeration Basins T-2A, B, & C), Secondary Clarification (Secondary Clarifiers T-3A, B, & C) along with UV disinfection and NPW pumping. Green coding depicts the solids handling and dewatering facilities where solids are stabilized by anaerobic digesters (T-14 A, & B), and stored as liquid biosolids (T-15, volume: 750,000 gallons) or as dewatered biosolids within the dry sludge storage building (capacity: 160 dry tons). Methane gas is stored in the secondary anaerobic digester/ gas holder (24,000 cu ft) (T-14C).

The daily average flow is 4.6 MGD, and this flow may be split evenly (1.53 MGD) to each of three primary clarifiers (volume: 565,000 gallons each). Thickened primary sludge (5.8% solids) is pumped directly to the primary digesters (Volume: 750,000 each) at a rate of 8,000 gpd. The primary clarifier effluent flows evenly (1.53 MGD) into three aeration basins (volume: 875,000 gallons each), and after a minimum of 6 hours, the mixed liquor flows are evenly split (1.53 MGD) into three secondary clarifiers (volume: 780,000 gallons each). Activated sludge is returned evenly at a flow paced rate from each clarifier to each of the aeration basins, or wasted (approx. 45,000 gallons each day) to the anaerobic digesters after thickening. Secondary effluent flows are combined before entering the UV disinfection facility (capacity: 24 MGD) prior to effluent metering and sampling at the parshall flume which is included within the UV Facility.

MEMORANDUM
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER DIVISION
Blue Ridge Regional Office

Subject: Site Visit for Reissuance of VPDES Permit VA0062685 – Pepper's Ferry Regional Wastewater Treatment Authority

To: Permit File

From: Bob Tate, Water Permit Writer

Date: February 10, 2014

Introduction

The Pepper's Ferry Regional Wastewater Treatment Authority Facility (facility) was visited Friday morning, February 7, 2014, for VPDES permit reissuance. The site visit consisted of a tour of wastewater treatment operations and observations at the outfall.

Previously on January 2, 2014, the permit writer met on-site with Clarke Wallcraft (executive director), Mac McCutchan (plant superintendent), and Robbie Graham (technical services manager). Discussions concerned the permit reissuance application and included storm water coverage, ultraviolet disinfection, biosolids, and PCB monitoring. The facility will reregister for the VPDES Industrial Storm Water General Permit rather than include storm water coverage in the individual permit. Ultraviolet disinfection has replaced chlorine disinfection, and the next permit will reflect that change. The next permit's biosolids components are expected to comprise a separate section (Part III) with content updated to current biosolids regulations. The current permit requires two rounds of PCB monitoring during dry conditions for development of a New River PCB TMDL. "Dry monitoring" was completed in accordance with the permit. The permit writer neglected to include in the current permit two rounds of monitoring during wet conditions. DEQ TMDL staff expressed a need for "wet monitoring." Facility staff agreed to try and conduct two rounds of "wet monitoring" before the current permit expires September 30, 2014.

Wastewater Treatment

Mike Hutchinson and Allen McMillan led the writer around the facility to observe treatment units and processes. Operation observations began at the headworks where all raw wastewater enters the facility. At the headworks raw wastewater is screened and grit is removed. Wastewater is pumped from the headworks to the primary clarifiers. Between the headworks and primary clarifiers recycle flows enter the stream and then the stream is metered. A splitter directs wastewater flow to one of three circular primary clarifiers. Two primary clarifiers were operating, which is normal. Primary sludge is pumped to the sludge handling building. Primary clarifier effluent flows by gravity to a splitter which directs flow to one of three rectangular

aeration (activated sludge) basins. Two aeration basins were operating (normal). Air is provided by fine bubble diffusers. (Two new turbo blowers replaced the previous three roots blowers. A third turbo blower will be operational in spring 2014.) The long aeration basins and low flows promote nitrification. Lime added at the New River Pump Station provides alkalinity consumed during nitrification. After a minimum of six hours, aeration basin effluent (gravity) flows to a splitter that directs wastewater to one of three circular secondary clarifiers. All three secondary clarifiers were operating (normal). Secondary (activated) sludge is either returned (pumped) to the aeration basins or wasted (pumped) to the sludge handling building. Secondary clarifier effluent (gravity) flows to the new ultraviolet (UV) disinfection building. UV disinfection replaced chlorine disinfection in July of 2012. The disinfection unit consists of 4 operational channels, each designed for 6 MGD (max) operation. Each channel has two banks of UV bulbs. The unit is controlled automatically, or manually when desired. Two channels were operating (normal). A fifth channel is in place but is not equipped. Sampling for BOD, TSS, and *E. coli* analyses is immediately after disinfection. Other parameters, including (pH, dissolved oxygen, temperature, are monitored approximately 180 feet downstream. Effluent flow is metered at a Parshall flume. Treated effluent flows (by gravity) through 5700' of 36"-48" pipe to Outfall 001 on the New River.

Two retention basins are available for flows in excess of treatment capacity. Raw wastewater is pumped from the retention basins back to the head works. Both retention basins were empty. The primary diversion line in no longer usable. This line (from the primary clarifiers to the chlorine contact tanks) allowed secondary treatment processes to be bypassed when the facility received extremely high flows.

Sludge Treatment and Disposal

Waste sludge from the secondary clarifiers is pumped to the sludge handling building for thickening by dissolved air floatation (DAF). Polymer feed for DAF is available. Thickened secondary sludge goes to one of two primary (anaerobic) digesters. Sludge from the primary clarifiers is pumped to the primary digesters without thickening. In the primary digesters, gas cannons create violent mixing. If additional alkalinity is needed, lime can be added via the thickened sludge pit and pumped to the digester using thickened sludge pumps. From the primary digesters, stabilized sludge and methane gas go to a single secondary digester that temporarily holds gas and sludge. Sludge settles and decant is pumped to the headworks. Methane gas is captured and stored to heat digesters. Stabilized (digested) sludge is stored until dewatered by a belt-filter press with polymer feed. Fully treated sludge is stored dry under roof. There are two options for disposal of treated dry sludge. The preferred option is application to local farm fields as biosolids. The backup option is disposal at a local sanitary landfill (New River Solid Waste Management Area). The facility supervises land application processes. Facility staff includes one licensed nutrient management planners and four certified biosolids land appliers.

Outfalls

There are three outfalls for the facility: one (001) for treated wastewater and two (001 and 002) for storm water. Storm water was not observed or evaluated at the site visit because the facility is registered for the VPDES Industrial Storm Water General Permit.

The treated wastewater outfall (001) is located over a mile from the facility site. The discharge pipe is grated and anchored/embedded in concrete. No foaming was observed near the outfall. The outfall location prevents effluent from reaching the Radford Army Ammunition Plant's raw water intake across the river. The intake is shielded from effluent by a rock-walled diversion channel.

Other

A septage receiving station is located beside the sludge handling building. Drying beds are available for dewatering grit and other materials from jurisdictional public works departments. Non-potable water pumps are now located in the UV building. Backup power is provided by two generators (600 KW and 450 KW) inside the disinfection building. These generators will be replaced by a 1000 KW generator to be located outside. The Radford Pump Station and the New River Pump Station/Equalization Basin were not visited. These two facilities and their associated force mains are owned and operated by the Pepper's Ferry Regional Wastewater Treatment Authority. Other pumps stations and sewer lines are owned and operated by local government affiliated organizations.

The following stream observations were made at the outfall. Some observations were made or confirmed using aerial photos (photo) on DEQ's GIS site.

cross-section: wide shallow arc (difficult to determine)
channel: straight for ¾ mile, slight bends for 2 miles, 90 degree bend for 1¼ mile (photo)
pool and riffle character: yes – 50% pools and 50% riffles for first 1,500 feet (photo)
bottom: rock – small, large and boulders
sludge deposits: none
vegetation: no rooted plants; some algae on nearby rocks (unable to observe beyond)
estimated stream width: 325 feet – 600 feet (photo)
estimated depth (maximum): unable to determine
stream relatively clear with some green color

Stream flow appeared to be greater the 7Q10.